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$(36-31.736) \div 2 = 2.132$  in. thickness of shell.

This problem was solved with same result, by *Hon. Josiah H. Drummond, J. F. W. Scheffer, Frank Horn J. K. Ellwood, and Cooper D. Schmitt.*

**39. Proposed by P. C. CULLEN, Superintendent of Schools, Brady, Nebraska.**

*A, B, and C start from same point at same time. A north at rate of three miles per hour, B east at rate of four miles and C west at rate of five miles per hour. B at end of two hours starts at such an angle as to intersect A. How long after starting must C start north-west in order to meet A and B at common point?*

**Solution by HON. JOSIAH H. DRUMMOND, LL. D., Portland, Maine, and J. W. WATSON, Middle Creek, Ohio.**

Let  $x$  be the time after  $B$  turns till he meets  $A$ . The route of both is a right angle triangle with base 8; perpendicular  $3x+6$ , and hypotenuse  $4x$ . Hence,  $16x^2 = (3x+6)^2 + 64$ , whence  $x = 7\frac{1}{4}$  or  $-2$ . But the  $-2$  value makes them turn back and meet at point of starting. Let  $y$  = time before  $C$  turns. Then  $7\frac{1}{4} + 2 - y$  = time after he turns.  $3x+6 = 1\frac{1}{2}y$  = perpendicular,  $5y$  = base, and  $5(\frac{6}{4}-y)$  = hypotenuse. Hence,  $25y^2 + (\frac{1}{2}y)^2 = 25(\frac{6}{4}-y)^2$ , whence  $y = 2\frac{1}{4}\frac{2}{3}$  hours.

Excellent solutions of this problem were received from *G. B. M. Zerr, P. S. Berg, J. K. Ellwood, Cooper D. Schmitt, and J. F. W. Scheffer.*

**40. Proposed by F. P. MATZ, M. Sc., Ph. D., Professor of Mathematics and Astronomy in New Windsor College, New Windsor, Maryland.**

Find the market-price of  $m = 3\%$ -stock, in order that it may yield  $n = 3\frac{1}{2}\%$  interest after deducting  $d = \$\frac{7}{10}$  from every  $S = \$12$ .

**Solution by the PROPOSER.**

According to the conditions of the problem, the deduction from the the par (\$100) value of a share is  $100d \div S$  dollars,  $= \$1\frac{5}{6}$ ; therefore,  $100(1-d \div S)$  dollars are to yield  $\$m$  interest. In order to yield  $\$n$  interest,

the market-price must be  $P = 100 \left( \frac{m}{n} \right) \left( 1 - \frac{d}{S} \right)$  dollars,  $= \$87\frac{3}{4}$ .

COR.—Put  $m = n$ ; then  $P = \$97\frac{1}{2}$ , which is the correct result of this problem as proposed in the December, '94, MONTHLY.—*F. P. M.*

**41. Proposed by F. P. MATZ, M. Sc., Ph. D., Professor of Mathematics and Astronomy in New Windsor College, New Windsor, Maryland.**

If I gain \$2 in \$5 by selling a horse for \$150, what per cent. would I gain by selling the horse for \$120?

**Solution by P. S. BERG, Apple Creek, Ohio, and the PROPOSER.**

Since gaining \$2 in \$5 is gaining 40%, the cost of the horse is \$107\frac{1}{2}. Hence the gain required is 12%.

## PROBLEMS.

**46. Proposed by T. W. PALMER, Professor of Mathematics, University of Alabama.**

*A borrows \$500.00 from a Building and Loan Association and agrees to pay*